

## CLAIMS

What is claimed is:

1. In a computer network environment comprising a wired computer network  
5 implemented by at least one network device operative to switch or route data units  
between devices connected thereto, the data units including a source address and a  
destination address, wherein the at least one network device comprises at least two  
ports to which other devices connect, and wherein the at least one network device  
is operative to store the source addresses of the data units encountered at the ports  
10 of the at least one network device, a method for containing rogue access points,  
comprising  
    detecting a rogue access point, the rogue access point connected to the wired  
computer network and bridging wireless traffic between at least one rogue client  
and the wired computer network;  
15      determining the address of at least one rogue client associated with the  
rogue access point; and  
    identifying the port to which the rogue access point is connected by querying,  
using the addresses of the at least one rogue client in the determining step, the at  
least one network device for the port at which data units sourced from the at least  
20 one rogue client were encountered.
2. The method of claim 1 further comprising  
    disabling the identified port.
- 25 3. The method of claim 1 further comprising  
    locating the edge port, if more than one network device responds in the  
polling step.

4. The method of claim 1 wherein the at least one network device is an Ethernet switch.

5. In a wireless network environment comprising at least one authorized access  
5 point, a method for containing rogue access points, the rogue access points  
including a virtual carrier-sense mechanism operative to adjust a counter in  
response to wireless frames transmitted from wireless stations, wherein the data  
frames include a duration value, the counter controlling the transmission of frames  
by the rogue access point, comprising  
10 detecting a rogue access point,  
identifying at least one authorized access point that neighbors the rogue  
access point;  
selecting at least one authorized access point in the identifying step;  
configuring the at least one selected access point to periodically transmit  
15 wireless frames, the data frames including a predetermined duration value, and  
wherein the interval at which the data frames are periodically transmitted is less  
than the duration value.

6. The method of claim 5 wherein the wireless frames are transmitted on all  
20 available frequency channels.

7. The method of claim 5 further comprising  
identifying the channel on which the rogue access point is transmitting; and  
wherein the wireless frames are transmitted on the identified channel.

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8. The method of claim 5 further comprising  
identifying the channel on which the rogue access point is transmitting; and  
wherein the wireless frames are transmitted on a range of channels centered on the  
identified channel.

9. In a wireless network environment implementing a protocol according to which wireless stations terminate connections with access points upon receipt of de-authentication and/or disassociation frames, a method for containing rogue access  
5 points, comprising

detecting a rogue access point, the rogue access point identified by a wireless network address;

selecting at least one authorized access point;

emulating the rogue access point and terminating the connections between  
10 the rogue access point and the wireless client devices associated with the rogue access point to prevent transmission of frames between the rogue access point and the wireless client devices associated with the rogue access point.

10. The method of claim 9 wherein the emulating step comprises

15 periodically broadcasting, at a repetition interval, de-authentication frames, wherein the source address of the de-authentication frames is the wireless network address of the detected rogue access point.

11. The method of claim 10 wherein the repetition interval is heuristically  
20 determined to prevent wireless clients from transmitting data to or receiving data from the rogue access point.

12. The method of claim 10 further comprising reducing the repetition interval upon detection of data frames transmitted between the rogue access point and a  
25 wireless client device.

13. The method of claim 10 further comprising

periodically broadcasting, at a second repetition interval, disassociation frames, wherein the source address of the disassociation frames is the wireless network address of the detected rogue access point.

5 14. The method of claim 9 wherein the emulating step comprises

periodically broadcasting, at a repetition interval, disassociation frames, wherein the source address of the disassociation frames is the wireless network address of the detected rogue access point.

10 15. The method of claim 9 wherein the emulating step comprises

periodically broadcasting, at a repetition interval, beacon frames, wherein the beacon frames announce a contention-free period, and wherein the contention-free period is greater than the repetition interval.

15 16. A rogue containment device, comprising

a network interface operably connected to a computer network to communicate with at least one wireless network access device,

a rogue containment module operative to

receive data characterizing a rogue access point;

20 configure one or more of the at least one wireless network access device to transmit rogue-containing, wireless frames operative to contain the rogue access point.

17. The rogue containment device of claim 16 wherein the at least one wireless  
25 network access device is an access point.

18. The rogue containment device of claim 16 wherein the at least one wireless network access device is an access element in a hierarchical wireless network system.

19. The rogue containment device of claim 16 wherein the rogue containment module is operative to configure one or more of the at least one wireless network access device to emulate the rogue access point and transmit connection-  
5 terminating frames.

20. The rogue containment device of claim 19 wherein the connection terminating frames are de-authentication frames.

10 21. The rogue containment device of claim 19 wherein the connection terminating frames are disassociation frames.

22. The rogue containment device of claim 19 wherein the connection terminating frames are transmitted at a fixed repetition interval.

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23. The rogue containment device of claim 19 wherein the connection-terminating frames are transmitted as a repetition interval, and wherein the repetition interval is adjusted in response to detection of wireless traffic transmitted between the rogue access point and a wireless client.

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24. A wireless network system enabling a directed association mechanism, comprising

a plurality of access elements for wireless communication with at least one remote client element and for communication with a central control element;

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a central control element for supervising at least one of said access elements, wherein the central control element is operative to manage and control the wireless connections between the access elements and corresponding remote client elements; and

wherein the access elements are each operative to:

establish and maintain, in an access point mode, wireless connections with remote client elements;

switch to a scanning mode for a scanning period at a scanning interval to detect wireless traffic,

5 record scan data characterizing the detected wireless traffic, and

transmit the scan data to the central control element;

wherein the central control element is operative to

process the scan data against information relating to known  
10 access elements to identify rogue access points,

to contain the detected rogue access point(s).

25. The system of claim 24 further comprising a computer network, wherein the central control element is coupled to the computer network, and wherein the  
15 central control element is operative to

establish a tunnel with access elements for transmission of wireless traffic associated with corresponding remote client elements, and

bridge network traffic between the computer network and a remote client element through a tunnel with a corresponding access element.

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26. The system of claim 25 wherein the computer network comprises at least one network device operative to switch or route data units between devices connected thereto, the data units including a source address and a destination address, wherein the at least one network device comprises at least two ports to which other  
25 devices connect, and wherein the at least one network device is operative to store the source addresses of the data units encountered at the ports of the at least one network device, and

wherein the central control element is operative to

determine the address of at least one rogue client associated with the  
rogue access point; and

identify the port to which the rogue access point is connected by  
querying, using the addresses of the at least one rogue client, the at least one  
5 network device for the port at which data units sourced from the at least one rogue  
client were encountered.

27. The system of claim 26 wherein the central control element is operative to  
report the identified port to a network administrator.

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28. The system of claim 26 wherein the central control element is operative to  
disable the identified port.

29. The system of claim 24 wherein the central control element is operative to  
15 configure one or more access elements to contain the detected rogue access point(s).

30. The system of claim 29 wherein the central control element is operative to  
configure one or more of the access elements to emulate the rogue access point and  
transmit connection-terminating frames.

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31. The system of claim 30 wherein the connection terminating frames are de-  
authentication frames.

32. The system of claim 30 wherein the connection terminating frames are  
25 disassociation frames.

33. The system of claim 30 wherein the connection terminating frames are  
transmitted at a fixed repetition interval.

34. The system of claim 30 wherein the connection-terminating frames are transmitted as a repetition interval, and wherein the repetition interval is adjusted in response to detection of wireless traffic transmitted between the rogue access point and a wireless client.

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